

**AC 2008-573: CONTRIBUTIONS OF INTERNATIONAL STUDENTS TO
ENGINEERING GRADUATE SCHOOLS IN THE UNITED STATES**

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Contribution of International Students to Engineering Graduate Schools in the United States

Abstract

Many academic institutions in the United States have been looking for more expansion and exposures worldwide. They have been promoting their graduate programs to around the globe to the students who seek educational opportunities in the states. This paper discusses the importance and the criticality of having international students in the engineering graduate schools in the United States. It addresses the value of diversity they add, the contribution of international graduate students to the university expansion, and the university's international image as a recognized institution around the world. In this research, we investigate the key factors that motivate the international students to join engineering graduate schools in the USA. We discuss the added values resulting from this mutual interaction, and how this interaction serves as a feedback mechanism to the assessment of learning and the expansion process.

Some of the reasons that appeal the international students to enroll in the engineering graduate programs in the states are the research quality and the invaluable experience of exposure to the industry that provides research funding. These exposures provide windows of opportunity for the students to apply theories in the form of real life applications. Furthermore, international students play a significant role in spreading their positive experience worldwide, and they bridge the gaps of enriched interactions between civilizations. Moreover, international students, whether they stay in the states or return their home countries, publicize the high quality of work in many different conducts that are discussed here in this paper. Most importantly, we elaborate on the causes and some of the adverse effects of relative decline in the number of international students pursuing graduate degrees in engineering schools in the U.S.

Introduction

Many academic institutions in the United States have been seeking expansion and exposures worldwide. This is not a new trend, but it is more fluctuating trend in recent years due to the new global challenges. Some of these challenges are economical while others are social. For many years, American universities have been promoting their graduate programs internationally to attract foreign students who seek educational opportunities in the states. There are many benefits to this expansion, some of which are discussed in this paper. We address and discuss some of the importance and the criticality of having international students in the engineering graduate schools in the United States. Among other benefits, international students add to the value of diversity, and they contribute to the university's expansion. They also promote the university's international reputation and image as a recognized institution worldwide. In this research, we address some of the key factors that motivate the international students to join engineering graduate schools in the USA. We discuss the added values resulting from this mutual interaction, and how this interaction serves as a feedback mechanism to the assessment of learning and the expansion process.

Human Resources Benefits

The quality of the human resources and human knowledge is one of the crucial parameters to any society in which the amount of available knowledge can be determined. It is more likely that the more knowledgeable the human resources, the more applications for this knowledge will be discovered and developed. This will help with the vital task of having a high quality of researchers and students to improve the nation's innovation and economic development among these highly competitive environments¹.

The American academics and professional community are aware of this, and they started to get more internationals involved in the academic and the economic life cycle in the United States. This is particularly applicable in science and engineering fields due to the demand for skilled and technically competent professionals. It is also essential in technology-related fields where there are strong bonds and interactions between these fields and the industry. This help with creating an international reputation as professional and productive research environments that helped to create the knowledge from a global perspective. The international reputation created from these activities encourages international students and researchers to enroll in the engineering graduate programs in the United States. In many cases, graduate programs form the backbone of innovation and competitiveness. International graduate students play a significant role in spreading many of the values they acquire from the American society. For example, they bridge the gaps in the global standards, and enrich the interaction and dialogue between civilizations. Nevertheless, these graduate students will publicize their universities whether they stay in the United States after graduation or go back to their home countries. There are many ways to make this publicity more effective. We found empirically that the high quality of research and course work and the positive word of mouth are very effective.

Overview of the Current Situation

During the last few decades the United States has experienced a gradually growing inflow of graduate students from around the world. This increase has taken place despite the fact that the USA schools give preference to the domestic applicants². Most of the international graduate students in the United States are from Asia, and they earned more than half the engineering and science doctoral degrees awarded to international students. Today, the total number of foreign citizens studying in the United States (including undergraduates) is around half-million students. The percentage of foreign representation is highest at the doctoral level in science and engineering fields. In 2002 nearly one-third of all graduate students enrolled at United States universities came from abroad. The share of international graduate students has risen from 23.4 percent in 1982 to 34.5 percent in 2002 as shown in Figure 1.

In 2002, international students received 19.5 percent of all doctorates awarded in the social and behavioral sciences, 18.0 percent in the life sciences, 35.4 percent in the physical sciences, and 58.7 percent in engineering³. A recent study shows the changing in the demographics of graduate students in the United States institutions. In 1966, US-born males accounted for 71 percent of science and engineering PhD graduates, and 6 percent of graduate degrees were awarded to US-born females; 23 percent of doctoral recipients were foreign-born. In 2000, 36 percent of

doctoral recipients were US-born males, 25 percent US-born females, and 39 percent foreign-born⁴.

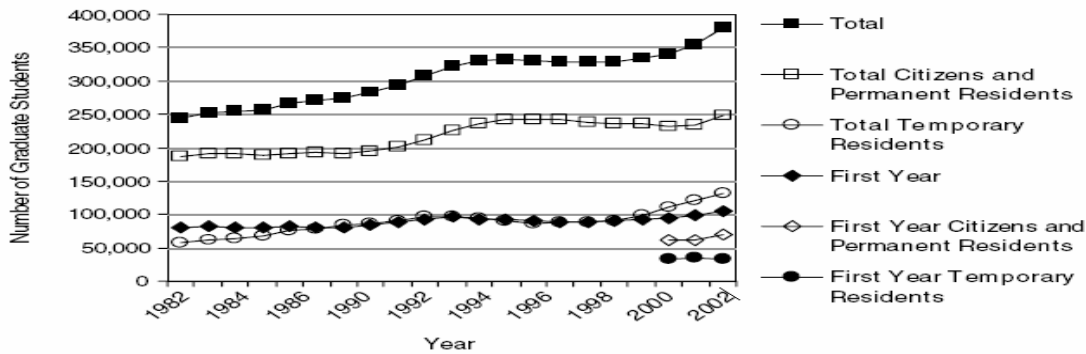


Fig.1 Total Full-time and First-year Science and Engineering Graduate Enrollments, 1982-2002.

National and Economical Impact

This section summarizes some of the effects of international scientists and engineers on the United States engineering enterprises, economy, and other national interests. Economists have debated whether the international scientists and engineers have a positive or a negative effect on the United States economy. Indeed, some studies pointed that the increase in the number of high-skilled immigrants will lower the wages of high-skilled US workers⁵. Nevertheless, the big corporations nowadays care about the international image of their staff members. They believe that diversity among their staff and employees helps with better market matches and cutting edge stands. We believe that cultural and gender diversity among students in academic institutions and among employees in corporate world brings different perspectives to the academic and corporate environment and substantially helps with the growth.

The rise of global competition for students, especially among countries where English is the dominant language, encourage these countries to emphasize the direct economic impact of international students, the inflow of fees, tuition, and living expenses for international students. The estimates for the revenues accounted from international students are around \$12.87 billion in the academic year 2003-2004⁶. This applies to all international students at all levels of study including graduate study and includes not only tuition and fees paid by undergraduates and professional students but also expenditures on travel, food, housing, incidentals, and the cost of supporting a family.

On the other hand, international students seek to study at the US academic institutions for many reasons. The reasons seem to have a really positive impact on the students' academic and future career path, particularly when they return to their home countries. However, some students get adapted to the American professional life. They seek employment opportunities more in the U.S. after graduation. Some of the reasons that motivate students to come from all over the world to study in the States are the experience and opportunities they gain by studying in one of the American academic institutions. We observe, by informal discussions with the students, that they feel that the American Universities provide so much opportunity to their students and expose them to a real life environment. Students feel that in such environments they are able to

apply what they learn in schools after graduation. They also feel that there are more funded-research opportunities in some American universities which might not be the same in the international students' home countries.

Research Quality

Research is the backbone of the graduate studies especially in sciences and engineering. Research forms a very important appealing factor to the international students in choosing their graduate programs. We observe that many graduate students feel that with good quality research they can find the opportunity to get involved in high technology and up to date industrial exposure. This conversion from being no more than an end user of the products, to a real source of development with a strong and efficient influence, increases the international students self confidence, who were only used to deal with theories without really connecting them to real life applications.

The high competition inside the United States, and the strong interaction between the industry and the research institutions, forces research to become one of the crucial sources of development. This yields these research institutions to emphasize on producing a high quality research to maintain a sustainable development in the high technology fields, and its impact on the economy and community. Thus, maintaining high quality of research is very essential to invigorate this unique relation ship between education and economics in the United States, having the international students as a renewable resource of innovation and diversity.

Summary and Conclusion

Many academic institutions in the United States have been looking for more international expansion and exposures. This paper briefly discusses the importance and the criticality of having international students in the engineering graduate schools in the United States. We empirically observe that the international graduate engineering students help with enriching the human resources required for a healthy workforce and economy. They also add to the value of diversity. Furthermore, they publicize the image of academic institutions worldwide. We empirically investigate some key factors that motivate the international students to join engineering graduate schools in the USA. We discuss the added values resulting from this mutual interaction.

Some of the reasons that appeal to the international students to enroll in the engineering graduate programs in the states are the research quality and the invaluable experience of exposure to the industry. These exposures provide windows of opportunity for the students to apply theories in the form of real life applications. Furthermore, international students play a significant role in bridging the gaps of enriched interactions between civilizations. Moreover, international students, whether they stay in the states or return their home countries, publicize the high quality of work in many different conducts. We discuss some of these conducts here in this paper and briefly look at the economical impact of international graduate engineering students in in the U.S.

References

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